



WILLIS INVESTMENT COUNSEL

Principled Investing

**PARADOX OF COMPLEXITY:
PENSION FUND MANAGEMENT EVOLUTION
TO ENDOWMENT MODEL AND LDI**

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Economic events and market returns of the last several years, coupled with changes in accounting and actuarial rules, have intensified the risk management focus on investment portfolios of corporate defined benefit pension plans. A more holistic approach that gives more consideration to pension fund liability risk is appropriate. However, the adoption rate of LDI strategies and the remarkable conversion of pension fund portfolios to the endowment model may contain elements of classic investor behavior. This paper finds evidence of pension funds and chief investment officers/portfolio managers possibly over-responding to “normal” market cycles, extrapolating recent trends, and herding toward recent over-performance and away from recent under-performance. If there has been an over-response, then it is questionable if LDI and the endowment model have been clearly superior to more traditional strategies.

OBJECTIVE OF PAPER

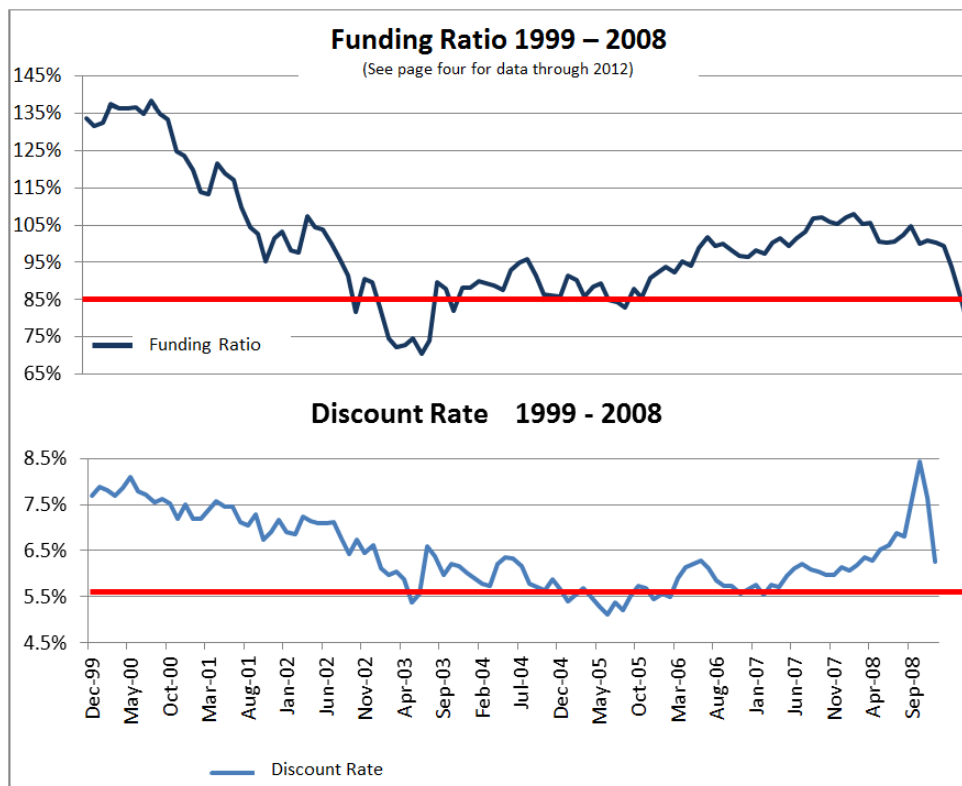
This paper is interested in how much *investor behavior* has influenced the remarkable shift in asset allocation over the last 10 years; and likewise influenced the shift toward liability driven investment strategies (LDI). There is no one-size-fits-all pension fund management strategy, and liability management should indeed be part of portfolio construction. But how much of the significant change in asset and liability management strategies has been associated with over-responding to cyclical markets and moving away from recently under-performing strategies to recently out-performing strategies? How effective has the shift to alternatives been and has the dramatic move away from the more traditional 60/40 investment model been worthwhile? And, how much market-timing risk was taken to implement LDI strategies?

In summary, this paper asks and evaluates the following questions:

- Have pension funds clearly benefitted from moving toward the *LDI model*?
- Have pension funds benefitted from moving toward the *endowment model*?
- Was the notable decline in the funding ratio primarily the result of a perfect storm or a secular change; or was it more about a “normal” cyclical trough in investment markets and interest rates?

BACKGROUND

In recent years, liability-driven investing, commonly known as “LDI,” has continued to be a popular topic in the pension fund management world due to changes in accounting, actuarial, and funding rules, and due to what is often cited as a *perfect storm* of historically low interest rates and low equity returns. The funding ratio was not persistently “alarming” before December 2008. Prior to December 2008, the natural up/down cycle of interest rates and investment markets usually offset each other enough to prevent the funding ratio from remaining below 85-95% for very long. In the aftermath of Lehman Brothers, AIG, Fannie Mae, and Wachovia in the fall of 2008, interest rates and equity values sharply declined resulting in a *perfect storm* with the funding ratio dropping and remaining below 85%. However, this was not altogether a perfect storm phenomenon. During 2009-2012, a continued decline in the discount rate overwhelmed robust pension portfolio returns pushing the funding ratio to a low of 71% in July 2012; the discount rate also reached its nadir of 3.92% in July 2012.



Such low discount rates and low funding ratios were rare before 2009 when the funding ratio was rarely below 85% and the discount rate was rarely below 5.50%. But 2009 – 2012 was a very different story. During this four year period, most months saw the funding ratio below 80%. Looking at common fiscal year-ends, the following table shows the funding ratio and pension liability discount rate during this historically low interest rate/high pension liability time period:

Month End	Funding Ratio	Discount Rate
Dec 08	78%	6.26%
June 09	78%	6.01%
Sept 09	78%	5.20%
Dec 09	82%	5.80%
June 10	76%	5.26%
Dec 10	84%	5.34%
June 11	91%	5.43%
Sept 11	77%	4.54%
Dec 11	79%	4.67%
June 12	75%	4.32%
September 12	74%	4.08%
December 12	77%	3.96%
June 2013	88%	4.74%
August 2013	89%	4.77%

Note decline from 6.26% in 2008 to 3.96% in 2012

Source: Milliman¹

Although at each of the above month-ends the rolling three year average funding ratio was never below 80%, corporations with September year-ends endured three consecutive years with the funding ratio below 80%. Corporate plans with a December year-end did not fare much better with two of the last three years experiencing a funding ratio below 80%. Notwithstanding the funding ratio has significantly improved during 2013 and stood at 90% on July 31, 2013 (due to plan sponsor contributions, continued strong equity market returns, rising interest rates, and mean reversion), there continues to be a strong interest in strategies to reduce financial statement volatility associated with DBPs.²

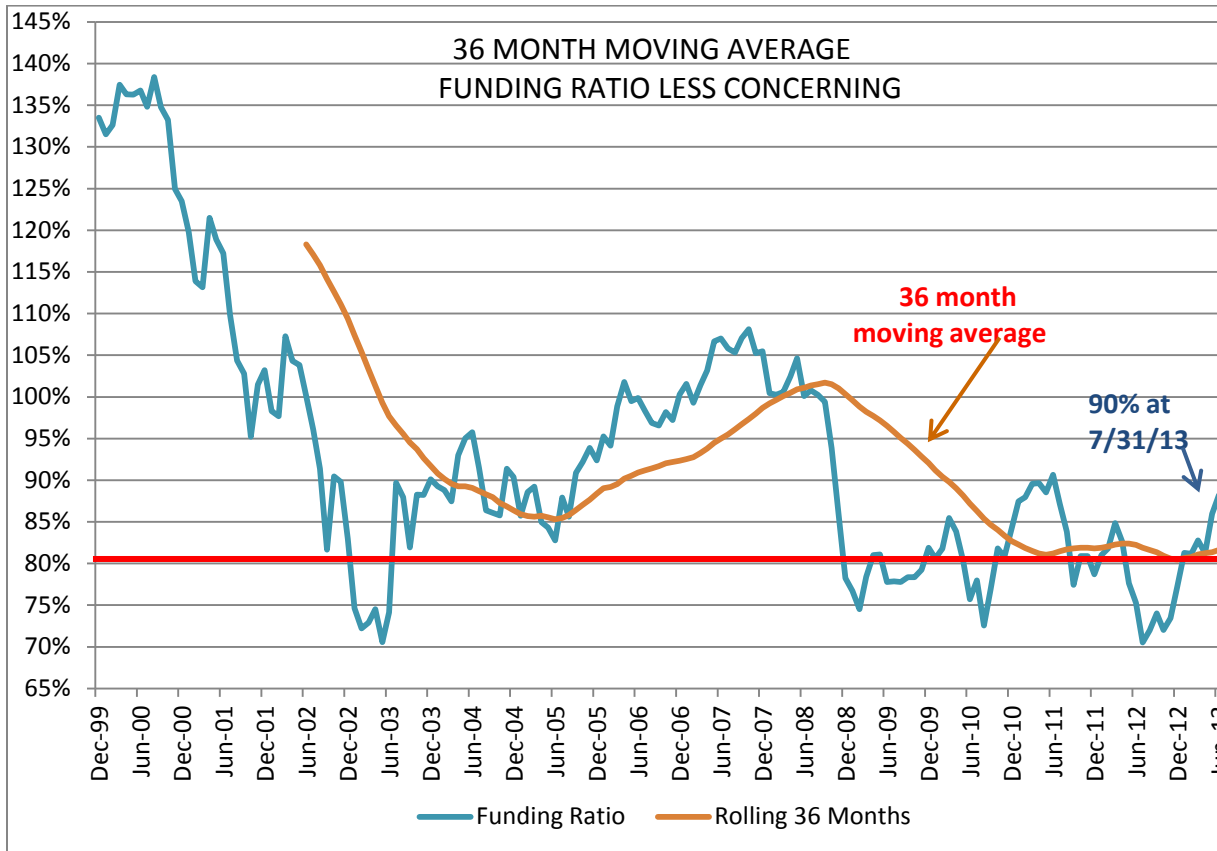
FUNDING RATIO HISTORY

The funding ratio is driven by the movement of pension fund liabilities and assets, whose values are driven by the interest rate market and investment markets (stocks, bonds, alternatives, real estate, commodities, private equity, etc.).

¹ Milliman Annual Pension Funding Study; based on U.S. generally accepted accounting principles. Special thanks to Zorast Wadia, FSA, EA, MAAA, a principal with Milliman who assisted me with this data. His review questioned some opinions stated herein, including (i) how influential the interest rate cycle was in decision-making and whether there has actually been a cycle over the last thirty years, (ii) how much of the funding ratio recovery has been attributable to patience and mean reversion versus plan sponsor contributions, (iii) whether the 2000-2003 funding ratio decline was more alarming to some than the 2008-2012 episode; and (iv) to what extent LDI was an interest rate or market timing bet versus prudent risk management. Also see Milliman’s report at www.milliman/insight/pensionfundingindex.

² Defined benefit plan. See Milliman; and BNY Mellon Pension Summary at www.bnymellon.com.

Those markets are inherently cyclical resulting in an inherently cyclical funding ratio. The following graph looks at the funding ratio for the period December 1999 to July 31, 2013. The blue line tracks the monthly funding ratio and the orange line is a rolling 36 month funding ratio average. Generally speaking, a working guideline suggests if the funding ratio does not stay below 80% for more than three years there usually are no, or at least manageable, consequence-triggers.³ With that guideline in mind, the following graph suggests during the last four years some CFOs might have been less concerned if a three-year moving average had been considered along with the fact markets usually mean-revert⁴:



³ Discussed these concepts with actuaries and pension consultants; generally, some of the consequences when the ERISA funding ratio falls below 90%, 80% and 70% follow: below 90% but above 80% usually does not trigger serious or unmanageable issues; when breach 80%, may not increase benefits at the 80% funding level unless immediate cash contributions keep the funding level at 80%; and below 80% triggers unwanted participant statement notices/disclosures about funding status and additional PBGC filings are required; and there can be potential adverse taxation of executive deferred compensation plans; when breach 70%, funding of executive deferred compensation plans may not be permitted; and when breach 60%, ongoing plan accruals must freeze and accelerated forms of payment (e.g., lump sum options) are disallowed.

⁴ Herein the convention "CFO" is used to denote the decision-maker to eliminate having to repeatedly list CFO, pension officer, pension fund committee, management, etc. as the context might suggest. CFOs had more than just the funding ratio to be concerned about; there were cash flow issues; pressure from unions and disgruntled retirees alarmed about the funding status of the plan; and the not knowing if rates might drop even further causing severe cash issues from ever higher required contributions. Some CFOs could not afford to be patient.

Of course, all CFOs did not view the above graph the same way. They held varying views about pension fund management and had different tolerance levels for the annual variability of funding ratios, cash contributions, pension expense, balance sheet impact and related issues. And some of those views found the above variability troubling and concluded the economic and investment landscape had so dramatically changed that traditional pension fund management strategies were passé.

RESPONSE TO A CHANGED WORLD

With the above history in mind, it is understandable some CFOs became increasingly desirous of reducing annual pension fund-related volatility as the “world indeed seem to have changed.” With the exception of the perfect storm in the aftermath of the dot.com bear market, CFOs had rarely been faced with funding ratios below 80%. For a brief period from January 2003 – June 2003, the funding ratio dropped below 80%; thereafter, it remained over 80% until December 2008.⁵ Since 2008, the funding ratio, pension expense, and required plan contributions have been quite volatile. The sharp drop in the funding ratio caused by the markets (the interest rate and equity markets) was exacerbated by changes in the pension law that, inter alia, increased required contributions.⁶ The resultant increased financial statement volatility led some CFOs to more carefully listen to consultants who often recommended LDI as the solution to better manage these DBP-related financial statement risks:

- Increased pension expense volatility and its negative impact on net income,
- Difficult-to-budget cash contributions to the pension fund,
- Balance sheet disclosure and reduction in shareholder’s equity,
- Reporting issues that further alarmed disgruntled retirees, and/or
- Pension fund/actuarial triggers at funding ratios of 90%, 80% and 60%.⁷

Not knowing when another perfect storm might hit, and not knowing just how low interest rates might go, hedging and volatility management became increasingly important to many CFOs and they responded in two primary ways – via asset allocation and LDI.

Asset allocation response to volatility. As will be discussed in detail below, many, if not most, institutional fund managers chose to experiment with a new portfolio structure to better manage volatility. Beginning around 2002, it became widely accepted that risk could be better managed with portfolios that had lower allocations to domestic equities and higher allocations to emerging markets and alternatives. By 2005, many pension fund portfolios looked dramatically different from the traditional 60/40 model.⁸ Complexity was widely embraced as the necessary prescription for volatile markets.

⁵ The funding ratio in this section and below tables from data provided by Milliman and from www.milliman.com.

⁶ PPA was signed into law in 2006, applied in 2008 and resulted in less smoothing; discounting rate used to value liabilities no longer related to asset return.

⁷ Severity of triggers is influenced by facts and circumstances of plan sponsor’s financial position. See footnote 3.

⁸ 60/40 denotes traditional portfolio asset allocation of approximately 60% equities and 40% bonds.

LDI response to volatility. LDI was not widely adopted until 2008. While it had become a popular topic in pension circles, it had not been broadly implemented. Naturally, as the Great Recession took hold and the equity markets plummeted, there was renewed interest in all forms of risk management. The drop in interest rates drove an increased interest in LDI, as did changes in accounting, actuarial, and funding rules. Beginning with December 2008, the funding ratio remained mostly in the 75-79% range and adoption rate of LDI surged.

Surveys of pension fund officers by Vanguard indicate LDI was in modest use before 2008 and then its use significantly increased.⁹

Year	% of Pension Funds That Initiated LDI	Discount Range	S&P 500 Return
2002*	6%	6.45-7.23	-22.06
2003	0	5.37-6.58	28.68
2004	2%	5.64-6.36	10.88
2005	3%	5.12-5.73	4.91
2006	3%	5.49-6.27	15.79
2007	8%	5.55-6.15	5.49
2008	16%	6.06-8.45	-37.01
2009	12%	5.09-7.00	26.46
2010	14%	4.93-5.92	15.06
2011	26%	4.53-5.55	2.11
2012	10%	3.92-4.88	15.96

*% of pensions funds that had adopted LDI in 2002 and prior years

It is reasonable to assume the increase in LDI usage was a response to declining and volatile asset returns, and to declining interest rates. If so, many CFOs effectively made two significant assumptions about the markets:

1. Asset returns. Recent under-performing asset classes would continue to under-perform so their allocation needed to be reduced (e.g., domestic equities), and recent out-performing asset classes would continue to out-perform so their allocation needed to be increased (e.g., alternatives).
2. Liability values. Interest rates would remain historically low keeping liability levels high and relief would not come from mean-reverting rates (some believe rates have become less cyclical and/or are artificially influenced by recent FOMC policy).

All investment decisions are based on assumptions; and most investment assumptions are some form of market-timing, market guesses, or market judgments. So it is unfair to use hindsight and reach conclusions about what should have been done when the future was not then known. However, it is fair to observe how typical investor behavior, including impatience, probably played an important role in the increased use of LDI and alternatives.

⁹ *Surveys of Defined Benefit Plan Sponsors*, 2012. Vanguard Research, November 2012. Figure 7, page 10. Percentage of DBPs surveyed by Vanguard that adopted some form of LDI for the first time in the indicated year.

INVESTOR IMPATIENCE MAY BE PART OF THE FUNDING RATIO PROBLEM

It is tempting to conjecture the funding ratio has only been a serious problem for the last four years; and perhaps the jury is still out on how problematic it really was (or is). Because markets are normally cyclical, and because “abnormal” market reversals occur more often than many believe and thus are not so abnormal, perhaps the market driven funding ratio of the last four years was not so extraordinary. Such a sanguine view might have been reasonable for the company with a strong balance sheet and ample cash position. However, for many companies, there is no doubt that changes in the law, and in accounting, actuarial, and funding rules, substantially changed the pension fund landscape and related financial decision-making. Therefore, it would be naïve to conclude pension volatility issues were trivial and CFOs simply needed to be more patient and allow the markets sufficient time to mean-revert. But, when one studies the data that tracks asset allocation and the adoption rate of LDI, it appears the following investor behavior issues were (and continue to be) present:

- Changing investment strategy in response to a market downturn
- Herding into a popular investment strategy following a period of its out-performance
- Extrapolation of a few years of extreme negative returns as the “new normal”
- Impatience

These *normal* investor behaviors have contributed to, or at least exacerbated, the funding ratio problem by reducing returns through increased fees and market timing leakage.¹⁰ As will be seen later herein, classic market-timing and herding behavior have been detrimental to investment performance and thus to the funding ratio (especially during the last five years). Buying high and selling low can be observed in shifts in asset allocation, flights to safety, and piling into alternatives.¹¹ Turning to LDI, while the reasons for LDI and when to adopt LDI are multi-faceted and certainly facts-and-circumstances, for many of those corporations that adopted LDI during the last 3-5 years it can be argued there were elements of over-responding to what may have been a cyclical trough in interest rates and equity markets.

Since 2002, institutional investors (pension funds and endowment funds) have substantially changed direction. The traditional 60/40 portfolio has been replaced with a portfolio that includes far more alternatives and far less domestic equities. The allocation to non-U.S. equities has increased. Following the 2008-2009 market debacle, the bond component has increased. What triggered this paradigm shift away from the traditional 60/40 model?

An excellent discussion of this paradigm shift is Robert Maynard’s *Conventional Investing in a Complex World*.¹² It is beyond the scope of this paper to dive very deep into this, but the following evolution provides a backdrop that likely led to investment decisions that contributed

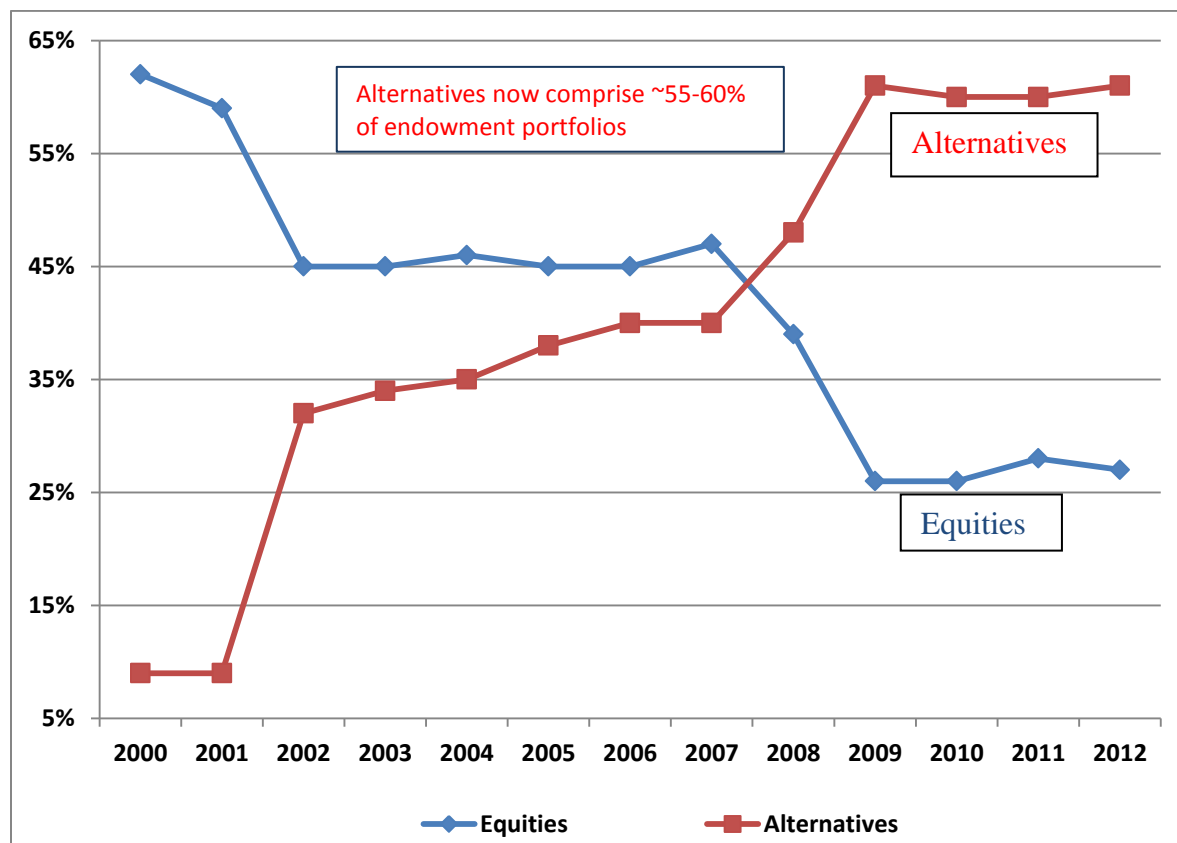
¹⁰ “Normal” because this behavior is very typical of institutional investor behavior. The LDI adoption rate also is likely a type of herding and contains similar market timing leakage.

¹¹ Julie Segal. “All the Wrong Moves”. *Institutional Investor*. December 2012. (citing State Street study).

¹² Robert Maynard. “Conventional Investing in a Complex World”. *The Journal of Investing*, Spring 2013. The author visited with him in Boise in September to discuss that article and he subsequently reviewed this paper.

to the funding ratio problem.¹³ In 2000, David Swensen published the superb *Pioneering Portfolio Management*, which introduced and popularized low domestic equity and high alternative allocations. Shortly thereafter, the 2000-2002 bear market shocked and disillusioned many investors bringing into question the traditional reliance on domestic equities (the S&P lost 42%). When the funding ratio dropped from 100% in June 2002 to 82% in September 2002, and then remained in the 71-75% range through June 2003, it caused another shock and further undermined CFOs' faith in traditional portfolios. It is quite plausible that these developments primed CFOs to listen to "new and better" ways to construct portfolios. The new and better way quickly became centered on alternatives as hedge funds gained enormous prominence. The following graph tracks the rapid allocation during 2003-2008 away from traditional equities to alternatives:

COLLEGE AND UNIVERSITY ENDOWMENT FUND ASSET ALLOCATION



Source: Nacubo (6/30 fyes)¹⁴

¹³ This backdrop is perhaps just one of many, but it is more than merely plausible given the well-documented fact that investors chronically chase performance, are short-term, and frequently follow a crowd-behavior path.

¹⁴ National Association of College and University Business Officers and Commonfund Institute; www.nacubo.org; the percentages in this graph are for endowment funds valued > \$1 billion; at 6/30/12 the median allocation to alternatives for the entire Nacubo universe was 54%. University endowments, and corporate and public pension funds, follow similar, but different investment policies; public funds have a wide range of statutory investment constraints.

It became widely believed that traditional markets were too correlated, the illiquid premium was needed in portfolios, and complex strategies were required to deal with the new order.¹⁵ The desire for less volatility (less correlation) and greater returns in a declining yield environment (the 10-year Treasury was well below 6.00% by 2003) made the pitch for a much greater allocation to alternatives very appealing. A primary element of that pitch was equity-like returns with meaningfully less volatility than traditional equities. Less volatility was especially appealing to CFOs dealing with pension fund volatility.

Traditional focus on asset returns. Meanwhile, this asset allocation paradigm shift did not abandon the traditional pension fund focus on asset returns. Until 2008, LDI strategies had not been widely adopted and most CFOs continued to embrace the traditional asset-based approach to pension fund management.¹⁶ To recall the basic assumption underlying traditional pension fund portfolio management:

If over long periods of time the pension fund’s *asset return* exceeds its *liability return*, the aggregate pension cost should be reduced. Said another way, if over time the net return (asset return minus liability return) is positive then the portfolio return should cause pension costs to be less.

For many years, this basic assumption held true and the traditional model was effective. That was certainly the case during the 80s and 90s when equity and bond market returns meaningfully exceeded the liability return. More recently, looking at January 2004 through November 2008, the funding ratio averaged 96%. It has “only” been the last four years that the funding ratio has become particularly concerning. Looking at *BNY Mellon’s Pension Summary*, one can find data to support and challenge the efficacy of traditional portfolio management.¹⁷ This monthly report looks at simulated *liability returns* and *asset returns* over rolling 1, 3, 5 and 10 year time periods. Generally speaking, when the asset return exceeds the liability return then one can assume, at least theoretically, the traditional approach that depends on asset returns reducing pension costs over time has been effective. The following table is from BNY’s June 2013 report:

EXCESS RETURN (ASSET RETURN MINUS LIABILITY RETURN)¹⁸

	One Year	Three Years	Five Years	Ten Years
Low Risk Portfolio	+9.50	+3.90	-0.90	+0.80
Moderate Risk Portfolio	+18.80	+5.20	-3.70	+0.70
Aggressive Portfolio	+23.30	+7.70	-3.90	+1.30
Long Duration Bond Portfolio	+2.10	0	-1.00	-0.10

¹⁵ Maynard

¹⁶ Vanguard survey

¹⁷ http://us.bnymellon.com/core/knowledge/pensions_reform/pension_liability_index/pension_liability_index.html

¹⁸ The BNY models include no alternative investment allocation; it is a traditional allocation.

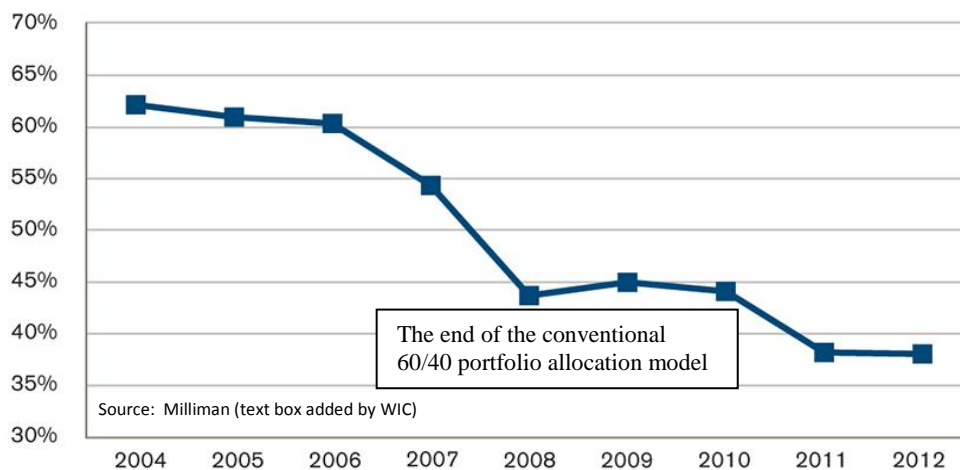
With the exception of the last five years, this data suggests the traditional approach has been generally effective if the CIO and portfolio manager stayed the course and appropriately rebalanced – two “big ifs”.¹⁹ Said another way, this data provides a counter-argument to those who claim the traditional asset return- based approach no longer works.

Investor impatience is a chronic investor problem that causes substantial long-term return leakage. It appears that same impatience and short-termism, along with chasing performance, has contributed to the funding gap problem. If so, then that investment problem, combined with the human nature tendency to extrapolate recent and dramatic trends, could have caused some to over-respond to a cyclical, impermanent issue. That over-response came in two forms: dramatic shifts in asset allocation, and adoption of LDI strategies that may have locked-in funding ratio deficits thereby causing higher future cash contributions. Both responses incurred (i) market timing risks, (ii) cost to change strategies (explicit and implicit), and (iii) additional complexity that carries its own risks.

PENSION FUND ASSET ALLOCATION RESPONSE

Although the above BNY Mellon data suggests the traditional model with sufficient patience generally would have been effective, many pension funds turned away from the traditional investment model and tried a new structure. As noted earlier, changes in investment strategy/asset allocation over the last ten years have been quite remarkable. The following graphs track the asset allocation changes made by large corporate pension funds over the last ten years. The shifts in investment strategy are very similar to those illustrated above with endowment funds. According to *Milliman’s Annual Pension Funding Study* of the 100 largest corporate pension funds, there was a remarkable asset allocation shift away from equities to *alternatives* and hedge funds.²⁰

ASSET ALLOCATION - EQUITIES

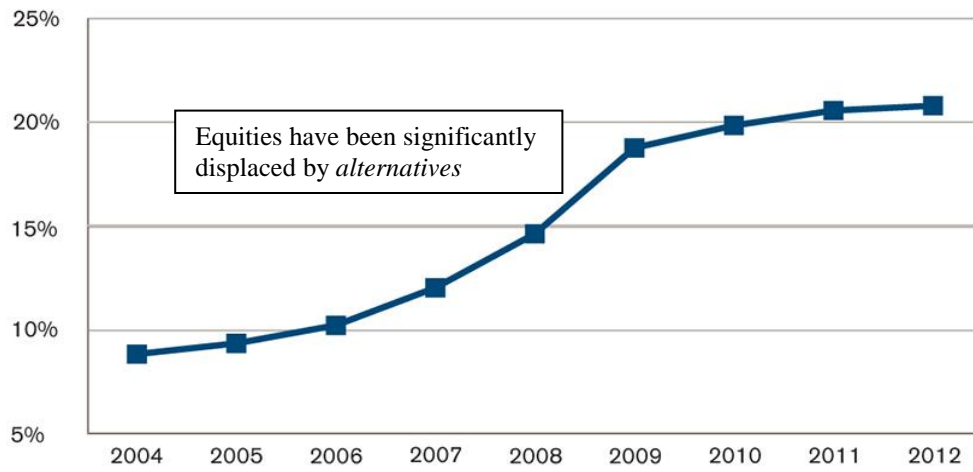


¹⁹ *Quantitative Analysis of Investor Behavior*, Dalbar, Inc, Boston, MA.; and *Institutional Investor* video series linked at home page of www.wicinvest.com.

²⁰ Milliman

Again, this investment strategy shift to alternatives and hedge funds was partly a reaction to/disillusionment with the dot.com bear market of 2000-2002 and wide adoption (herding?) of David Swensen's game-changing book *Pioneering Portfolio Management*.²¹

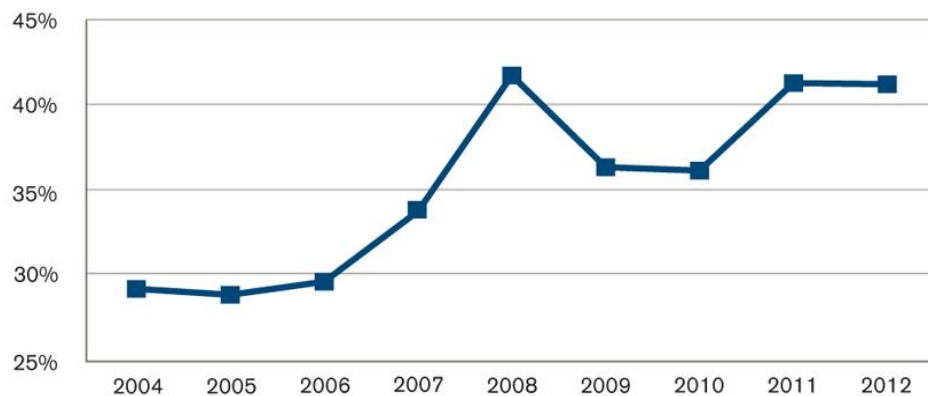
ASSET ALLOCATION - OTHER



Source: Milliman (text box added by WIC); includes foreign equities

Many responded to the 2008-2009 bear market by increasing the pension fund allocation to fixed income and alternatives and further reducing the equity allocation; a classic timing mistake that proved costly as the U.S. market followed its historical pattern of mean reversion with a powerful recovery.

ASSET ALLOCATION - FIXED INCOME



²¹ Julie Segal; Suzanne Duncan of State Street; State Street Center for Applied Research. *The Influential Investor How Investor Behavior is Redefining Performance*

In addition to evaluating trends in corporate pension funds, public pension fund asset allocations were also reviewed. Public pension funds have been a bit more conservative, but there has not been a significant difference in the asset allocation trend of corporate and public pension plans.²²

COMPLEXITY HAS NOT BEEN REWARDED

It is always difficult to know the best historical period from which to draw conclusions; and it is difficult to not choose those periods which prove one's point. When one looks at the last five years, the endowment fund model that "over-weighted" alternatives and "under-weighted" domestic equities appears to have been an inferior strategy vis-à-vis the less complex, traditional 60/40 model. On the other hand, when one looks at the last ten years, for those portfolios that allocated over 50% to alternatives, the endowment model's raw return is better than the traditional model. Looking at risk-adjusted returns is usually preferable to simply comparing raw returns, but with strategies that include alternatives finding a meaningful risk-adjusted metric is challenging due to infrequent valuation of illiquid securities.²³

Annualized Rates of Return and Standard Deviation through June 30, 2013²⁴

	5 year Return	10 year Return	Worst Year	10 year Std Dev
Endowment Model – A	3.69	8.43	-20.50	11.93
Endowment Model – B	3.78	6.16	-18.50	10.85
Traditional Model *	6.98	6.96	-13.84	11.94

*60% Wilshire/39% Barclays Lehman Agg/1% Tbill

Many alternative strategies were implemented for *absolute return*. To evaluate their efficacy and to recognize the limitations of standard deviation as a risk metric (especially annual standard deviation for only ten years), it is useful to observe the largest negative return year during the last ten years. The largest negative return year during the last ten years occurred in fye 6/30/09 when the NACUBO median fund (the whole universe) lost 18.70% versus -13.84% with the traditional model. Overall, one can reasonably question how "absolute" the absolute and other risk-reduction strategies actually were. For balance, it must be noted that one can creditably argue ten years is too short of a time period from which to draw such conclusions.²⁵

²² Milliman; Milliaman *Public Pension Funding Survey*; BNY Mellon; Public Fund Survey at www.publicfundsurvey.org.

²³ There are inherent limitations (some might say severe limitations that render standard deviation and risk metrics such as the Sharpe Ratio meaningless) with the valuation of the underlying securities of many alternative strategies, e.g., the valuation frequency, use of estimates, conflict of interests with general partners, etc.

²⁴ Based on Nacubo return data through 6/30/12 with estimate of 6/30/13: Endowment Model A uses Nacubo funds >\$1 bill; Endowment Model B uses Nacubo funds >\$25 bill <\$50 bill (similar asset allocation to pension funds).

²⁵ David Swensen's lecture at Yale. See www.yale.edu, search for David Swensen 2011 lecture 6.

Looking further back before the dot.com bear market to include a time period that hedge funds performed very well, it is difficult to conclude the endowment model has meaningfully performed better than the traditional model. From 12/31/92 – 12/31/11, a traditional model index (55% Russell 3000/15% EAFE/30% Barclays Aggregate Bond Index) out-performed the Hedge Fund Research Fund of Funds Index (HFRFOF).²⁶ Even if that 12/31/92 – 12/31/11 data is updated through 6/30/13, and changed to 50% HFRFOR / 50% Barclays Aggregate Bond Index to provide a more balanced total portfolio, the result is directionally the same.

Using the last published NACUBO data (as of 6/30/12), we can look at the ten years from June 30, 2002 when the traditional model-endowment model paradigm shift became prominent. The following table compares the “full bore” adoption of the endowment model by those endowment funds with assets greater than \$1 billion and the more modest adoption of the endowment model by those endowment funds with assets between \$25 and \$50 million (which have an asset allocation history similar to pension funds).²⁷

For 10 Years Ended June 30, 2012

	Return, annualized	Std Deviation of annual returns	Equities at 6/12	Bonds at 6/12	Alternatives at 6/12
> \$1 billion	7.60	12.01	26%	10%	60%
> \$25 < \$50 million	5.80	10.79	51%	24%	19%
Nacubo median	6.20	11.03	31%	11%	54%
Traditional Model*	6.27	9.45	60%	39%	0

*Assumes no alternatives, 60% Wilshire 5000, 39% Barclays Lehman Aggregate Bond; 1% T-bill

Relative to the traditional model, the more complex endowment model experienced greater standard deviation of annual returns, and the drawdown during the worse return year was not meaningfully less. One can argue standard deviation for annual returns that include infrequently valued and illiquid assets is not a meaningful indication of risk (and thus nor is the Sharpe ratio). Nonetheless, it is difficult to argue that those investment committees that adopted the endowment model experienced significantly less stress or a “smoother ride” over the last 10-12 years. Complexity, lack of transparency, illiquidity, etc. increase risk and should therefore be compensated. Therefore, it is not sufficient for the endowment model to only provide slightly greater returns (as did funds > \$1 bill) or slightly less variability of returns.

While attempting to reduce the variability of pension values and better manage pension liabilities were understandable and reasonable objectives, the foregoing shifts in asset allocation strategies, and adoption of LDI strategies, necessarily involved market timing risk.²⁸ Time will tell how effective these strategic shifts have been, but at this point it appears *the classic investment mistakes may have been made: over-responding to recent under-performance and chasing recent out-performance, along with impatience and short-termism.*²⁹

²⁶ Maynard, *Conventional Investing in a Complex World*, Exhibit 6, page 70

²⁷ Nacubo reports asset allocation and returns for a range of fund sizes (brackets).

²⁸ Significant changes in asset allocation, and among strategies, often contain unavoidable market timing.

CONCLUSION

It is not the intent of this paper to categorically state the endowment model is necessarily a flawed strategy; but it is the intent to look back and observe that the endowment model, with its attendant complexity and high fees, was not (and is not) a **required** strategy³⁰. Likewise, LDI was not (and is not) a necessary risk management strategy for all (or even most) DBPs. For those who were able to practice patience and discipline and adhere to a traditional asset allocation structure, the less complex traditional model was as effective, and arguably more effective, vis-à-vis relatively more complex approaches.

Risk management necessarily involves many judgments, some of which, if we are honest, are little more than educated guesses. Portfolio construction and pension fund liability management decisions include many such judgments. The future path of the markets (including interest rates) is always unknowable so it is unknowable which strategies will be optimal. It is likewise unknowable exactly how much hedging is needed. Likewise, the future path of pension law, accounting rules, funding rules and actuarial standards are unknowable. Models based on historical trends and correlations are useful, but are far from perfect guides.³¹ Mean-reversion is a powerful and persistent force, but is not an immutable law of physics. With that said, it appears many CFOs might have over-responded with their adoption of LDI and the endowment model. Only time will tell if they over-responded, but some observations follow.

LDI strategies. While LDI strategies come in many forms, LDI commonly involves a significant reduction of the DBP portfolio's equity component and an increased bond component with long duration. For several years, interest rates have hovered near historic lows. In such an interest rate environment (remembering the cyclical nature of interest rates), increasing bond duration exposes the DBP portfolio to significant market-timing risk.³² Additional market timing risk is associated with reducing the equity allocation to make room for more bonds. As indicated in the following table, this market timing risk was significant over the last several years:

Annualized Returns for Periods ended 8/31/13³³

	10 y	5 y	3 y	2 y
S&P 500	7.11	7.31	18.38	18.32
Bonds – govt/corp/mort	4.81	4.90	2.51	1.48
Bonds – govt/corp >10y maturity	6.85	7.89	4.06	3.35

²⁹ For example, over-responded to: the poor performance of traditional equities from 2000-2002; the strong performance of hedge funds during 1998-2002; the popularity of LDI; to interest rate trends 2008-2011; and to the recession and bear market of 2008-2009 (note the exodus out of equities into bonds).

³⁰ Maynard. His article covers this far better than we can.

³¹ Emanuel Derman. *Models Performing Badly*.

³² While the point of LDI is to manage the liability side of the equation and the funding ratio volatility (seeking a targeted bond return per se is not the objective), LDI is about a more holistic approach and investment strategy is part of that. Unrelated, see footnote 35 for comment on interest rate cycles.

³³ Annualized gross of fee returns. Bank of America/ML Advisory Services Group Index Monitor.

Going forward, to the extent interest rates remain stable or increase from this juncture, or equity values continue to recover, or both, LDI strategies could carry significant opportunity costs.³⁴ If the DBP portfolio is “excessively hedged” with LDI strategies, continued balance sheet recovery potential likely will be cut short should interest rates and equity values revert to normal historical levels. Of course, there are counter-arguments:

- Potential shortage of long-duration corporate bonds as more plan sponsors adopt LDI
- Rising rates could mostly impact the short end of the curve (curve flattens) and not significantly reduce long-duration bond values
- MAP-21 could mute impact of rising rates
- Corporate spreads could tighten
- Rates could rise less than anticipated
- Interest rates may be settling into a “new normal” and will remain low for years

Given where we are in the interest rate cycle, and given the recent strong performance of equities, it may be the greatest threat to the funding ratio over the next five years is not falling interest rates (and rising liabilities), but falling equity values. If so, perhaps the risk management focus should mostly be on asset volatility management – not liability volatility management.³⁵

Asset strategies; complexity not required. *Institutional Investor* recently published a video series on the under-performance of institutional portfolios.³⁶ The consultants and portfolio managers interviewed listed familiar and chronic reasons for sub-par performance: **performance-chasing**, short-term focus, social imitation or **herding**, ineffective committees and group-think, market timing, being **over-enamored with alternatives**, and **impatience**. Unfortunately, these behavioral traits are persistent and are found herein.

The last five years (06/30/08 – 06/30/13), which includes the worst of the bear market and its aftermath, further questions the efficacy of the endowment model. The substantial out-performance of U.S. equities vis-à-vis most asset classes, especially alternatives, is consistent with classic mean reversion and supports the efficacy of patience. But five years is too short of a time horizon from which to draw conclusions. For a more balanced argument, the following graph supports the endowment model and the traditional model. For the extraordinarily skilled and patient CFO, the Nacubo ten-year return for funds > \$1 billion (the red line) had an estimated annualized return of ~ 8.04% employing an average allocation to alternatives of 49%. For the presumably lesser skilled CFO with a small or no staff, the Nacubo ten-year return for the entire Nacubo universe (the blue line) had an estimated annualized return of ~ 6.31% employing an average allocation to alternatives of 39%.

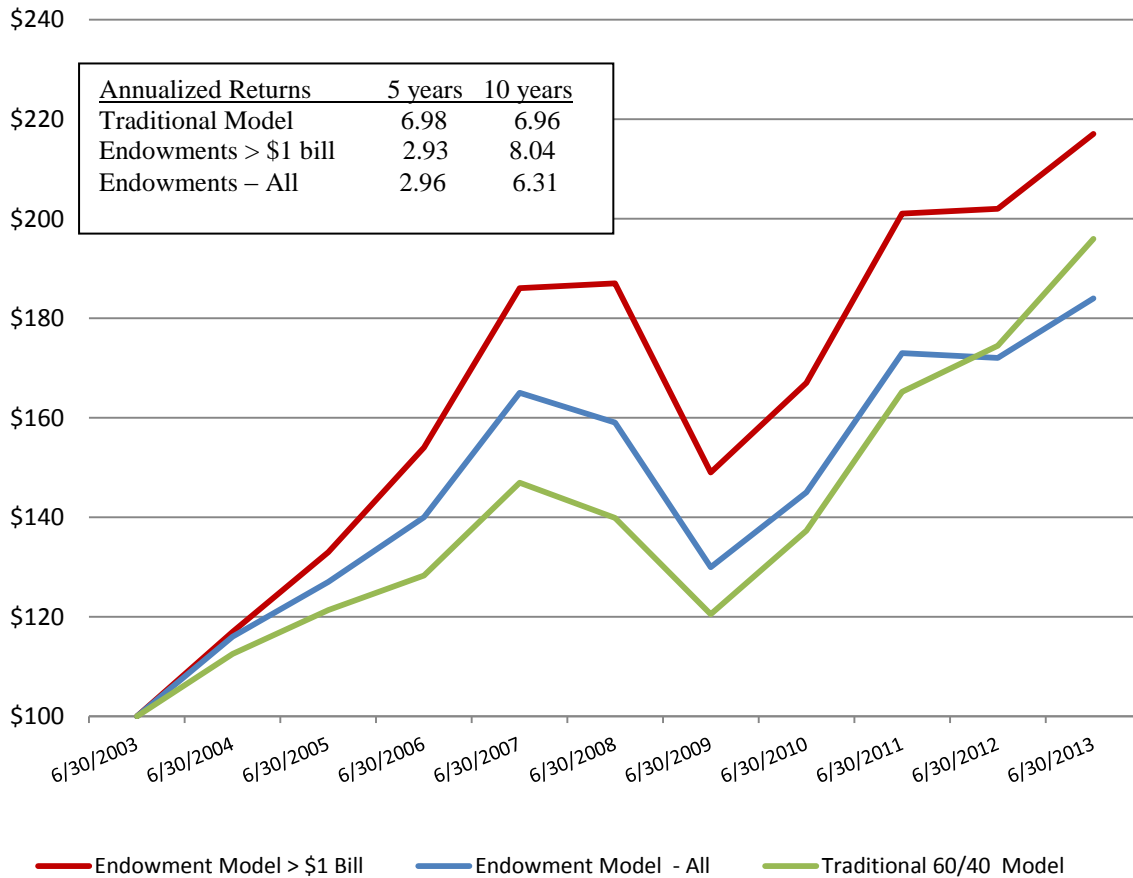
³⁴ In terms of continued balance sheet recovery and potential reduced net contributions over many years.

³⁵ Some who reviewed a draft of this paper took exception with the phrase “interest rate cycle” suggesting for decades there has not been a cycle. Some reviewers also noted interest rates have been recently artificially influenced by Federal Reserve policy further affecting any notion of a cycle.

³⁶ *Institutional Investor* video series and September 2013 cover story entitled “Is Alpha Dead”?

The traditional strategy's return of 6.96%, with no allocation to alternatives, exceeded the median endowment return and had a smaller loss in the worst fiscal year (June 30 year): -13.84 vs. -18.70 during 6/30/08.

Endowment versus Traditional Portfolio Model – 10 years ending 6/30/13³⁷
 (Traditional Model proxy: 60% Wilshire/39% Leh Agg Bond/1% Tbill)

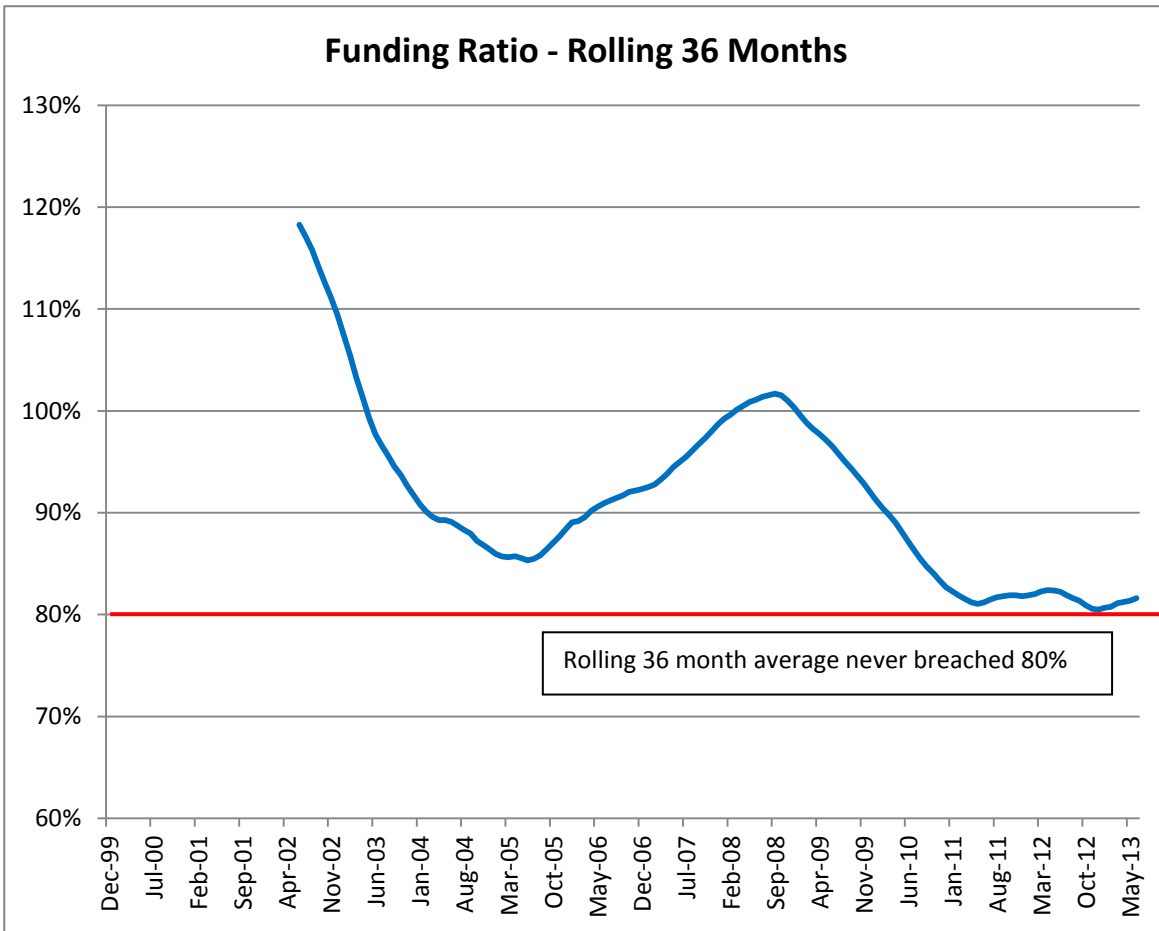


It is noteworthy how the above three strategies traced very similar paths across the ten year period and followed very similar trajectories during the 2008-2009 bear market.

Patience also applies to reacting to the funding ratio. For the CFO that was more patient and could afford to take a longer-term view, the rolling 36 month funding ratio may have appeared less alarming resulting in less pressure to change strategies. Looking at rolling three year periods beginning December 1999 – which was a very tough period for the funding ratio that included two severe bear markets and declining interest rates – the funding ratio never breached 80%.

³⁷ For all strategies, a key is being patient and staying the course, something all investors have great difficulty doing, especially when gloom and doom is pervasive. See *The Greatest Risk Has Been Excessive Pessimism* in the Commentary section of www.wicinvest.com.

For the CFO who chose to also give some weight to the five year moving average, that funding ratio metric did not breach 90% until December 2011, and never breached 80%.



While one can argue relying on three or five year moving averages could have led to underweighting the worrisome trend of the last five years, the inherently cyclical nature of the markets (and thus of the funding ratio drivers) suggests it is reasonable to give meaningful weight to moving averages (and mean-reversion) lest too much attention be given to one year's metrics. And too much weight given to one or two years' metrics can lead to over-responding to cyclical markets that usually mean-revert. Referring again to the BNY Mellon Pension Summary, the asset-based approach using a traditional portfolio model was indeed effective over the last ten years if the portfolio adhered to its policy and did not change course.

Closing with the questions raised in the beginning of this paper:

Have pension funds clearly benefitted from moving toward the *LDI model*? In terms of the funding ratio, it does not appear LDI was necessarily required as the problem was more temporary than permanent. However, LDI's efficacy may be in the eye of the beholder. For those CFOs who had to do something, who had to try to stabilize pension related variability, who had qualitative issues (e.g. unions) to consider, or who had other financing objectives (e.g., leverage metrics for a planned refinancing), LDI might have been a useful step. And, the improvement in the funding ratio has not just been a matter of recovering markets, mean reversion and patience; many plan sponsors have increased contributions to their plans.

Have pension funds benefitted from moving toward the *endowment model*? Based on the review herein of raw returns, absolute returns in the worst drawdown year, standard deviation of returns, and the added complexity and fees associated with the endowment model, it does not appear the endowment model has been meaningfully superior to the traditional model.

Was the notable decline in the funding ratio primarily the result of a perfect storm or a secular change; or was it more about a "normal" cyclical trough in investment markets and interest rates? As evidenced by the significant recovery in the funding ratio in 2013 (perhaps via normal mean reversion), a strong case can be made the funding ratio decline, though unusual and significant, was a "normal" part of the interest rate and market return cycle.

Complexity increases risk and therefore should only be added if necessary. It has not been the purpose of this paper to persuade the reader that the endowment model is an inferior investment strategy, or that LDI is unnecessary. It has been the purpose of this paper to persuade the reader that those strategies often are not required to effectively manage risks. In medicine, first do no harm; in engineering, design it only as complicated as necessary to accomplish the objective with the required safety factor; in portfolio management, reduce layers, fees and complexity.

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